

**Forecast Report No. 6-b
(May 11, 2020)**

COVID-19 FORECASTS IN THE PHILIPPINES: Addendum to Report No. 6

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OVERVIEW

Nearly two months into the Enhanced Community Quarantine of Luzon, the pandemic is still spreading. Here are some important points that we would like to emphasize in our study of Covid-19 in the Philippines.

1. Nationally, there seems to be a steady increase in Covid-19 cases all over the Philippines.
2. On a regional and provincial level, the trends vary. Some provinces have managed to contain the Covid-19 pandemic. Some provinces and cities have experienced late outbreak. The state of the pandemic in specific provinces and LGUs is analyzed in a later section.
3. The move towards mass testing has resulted in a clearer picture of the pandemic in the Philippines and in the respective provinces.
4. There is a delay in the reporting of Covid-19 cases, particularly in the NCR. This is covered in the next section.
5. There are about 1,200 unvalidated Covid-19 cases in the Philippines, according to data from the Department of Health. These cases, though still subject to validation, are generally included in the national count. In our models, we exclude their count in the provincial and city level forecasts. The model only takes into account confirmed and validated cases.
6. The success of the enhanced community quarantine (ECQ) can be observed in the flattening of the curve, i.e. the trajectory of Covid-19 cases becomes less steep or “flatter” due to the implementation of ECQ. As of today, we have 10,000 recorded Covid-19 cases when it could have been

30,000 or more (based on comparisons with countries which did not implement ECQ).

7. The peak of the curve will refer to the time when the number of active cases of Covid-19 is at its highest value. The number of active cases starts to decrease when the rate of recovery (and death) outpaces the rate of infection (this is the reciprocal of the reproduction number R , i.e. the number of active cases should decrease when $R < 1$). This is, however, a theoretical concept and may not be easy to observe in the data due to late reporting of recoveries (and deaths), item 8. Moreover, trends may reverse at any time. For example, in Cebu, the curve appeared to have peaked in early April (with $R < 1$), but new transmissions caused resurgence in the pandemic.
8. Recoveries from Covid-19 are reported when the patient has tested negative. Since this requires time for testing (and availability of testing kits), some recoveries will be reported later than when the patient actually became free of SARS-Cov2.
9. Because of delays in data reporting, such as time lags in obtaining testing results, and the huge number of unvalidated cases, current data are not very reliable. This makes calculation of the current value of the reproduction number R subject to a degree of error. The reproduction number R may appear to be lower than its true value due to the aforementioned delays. Nevertheless, estimates for R are provided as a guide to assess if the state of the pandemic is improving or not, with the caveat that these values are still subject to change as more data comes in.
10. The reproduction number R should not be the only decision tool used when making major policy changes in the management of the pandemic. Other decision tools are the current load of hospitals in the province or city, available facilities, quarantine areas, and the testing kits available.
11. As for the pandemic itself, the most practical way to determine if the pandemic is peaking in a certain province or city is to count the number of new infections over a period, say 1 or 2 weeks. As per South Korea's benchmark, **a low transmission rate is less than 1 new case per million of population per day.**
12. A second possible criterion for determining the state of the pandemic is by checking if the number of new cases has been decreasing. However, clustering of data may make this criterion less applicable.
13. A mathematical model is just a model and is at best an approximation of reality. The model is highly dependent on timely and accurate data. Models are only as good as the data used to model the pandemic. Models should always be corroborated by observed data.

DELAYS IN REPORTING

Figure 1 shows a plot of the number of Covid-19 cases in NCR for the week from April 16 to 22, 2020. The date on the x-axis is the date of the report. If we look at the graph, on April 23, there were 589 Covid-19 cases in NCR. By April 27, the count for the same period, accounting for late reports and addition to the database, had increased to 814. This means that 38% of the data was reported 5 days later. Most of the delays occur in major cities such as the NCR. This is important to note when making big changes in quarantine measures in the region, since current data will be incomplete.

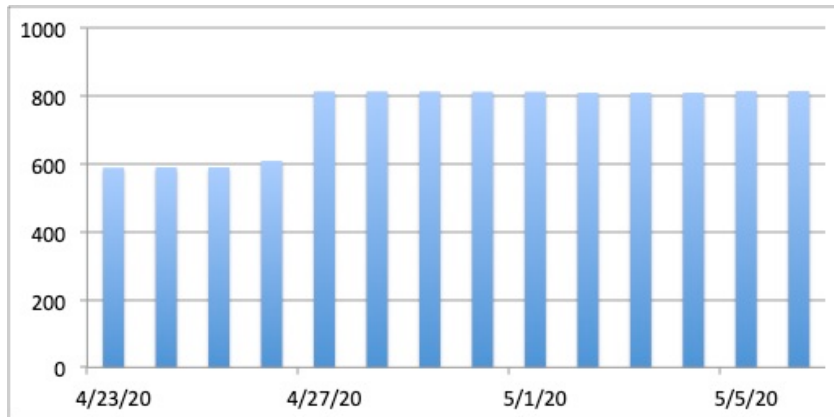


Figure 1. The number of Covid-19 cases in NCR for the week April 16 to 22, based on the date of the database. On April 23, the count was 589 cases. By April 27, the count for the same time period adjusted to 814. This means that after 5 days, there were an additional 225 cases, or 38%, reported late. Source: DOH data.

EVALUATION OF PANDEMIC MANAGEMENT PER PROVINCE

We use the following measures or grades in evaluating the state of the pandemic in each province (or city).

A – no new cases for the past 7 days

B – the average number of new cases for the past days is less than 1 per million of population, and the value of R (epidemiological reproduction number) is consistently less than 1 during the past 7 days. Those with less than 5 new cases over the past 7 days will also fall under this grade.

C – the value of R based on the most recent 7-day average is less than 1, but the average number of new cases for the past days is greater than 1 per million of population.

D - the value of R based on the most recent 7-day average is greater than 1

Data for individual provinces is provided from Table 1 to 17. **Total** (cases) refers to the total number of Covid-19 cases reported in the province. **Active** (cases) refers to the number of Covid-19 cases who have not died or recovered. **Died** and **recovered** are the number of patients who died or recovered from the disease, respectively. **New** (cases) are Covid-19 cases that were reported over the past week (from May 3 to May 9). The field **1 per M** checks if the number of new cases is less than 1 per million of population per day. **Grade** gives the grade based on the above evaluation. The reproduction number *R*, if calculated, is given in parenthesis after the province name, or in a separate column for the LGUs in NCR. Cases that are **for validation** refers to data reported to DOH but not yet validated, and are not included in the calculation of *R*. The tables do not include provinces with no reported cases of Covid-19 from the outset.

Table 1. Region I (Ilocos)

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
Ilocos Norte	4	2	0	2	2	YES	B
Ilocos Sur	1	0	0	1	0	YES	A
La Union	17	5	3	9	0	YES	A
Pangasinan	41	25	9	7	0	YES	A
For validation	1	1	0	0	0		

Table 2. Region II (Cagayan)

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
Cagayan	17	5	0	12	0	YES	A
Isabela	9	2	0	7	0	YES	A
Nueva Vizcaya	8	3	1	4	1	YES	B

Table 3. CAR

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
Abra	3	0	0	3	0	YES	A
Benguet	38	20	1	17	0	YES	A
Ifugao	1	1	0	0	0	YES	A
For validation	1	1	0	0	0		

Table 4. Region III (Central Luzon)

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
Bataan (0.59)	84	62	2	20	6	NO	C
Bulacan (0.58)	134	97	17	20	9	YES	B
Nueva Ecija (0.21)	50	40	1	9	0	YES	A
Pampanga (0.87)	63	45	5	13	6	YES	B
Tarlac (0.63)	31	25	1	5	1	YES	B
Zambales (0.55)	27	22	2	3	1	YES	B

Table 5. Region 4-A (Calabarzon)

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
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Batangas (1.21)	110	69	13	28	18	YES	D
Cavite (0.44)	292	224	25	43	9	YES	B
Laguna (0.63)	365	320	9	36	31	NO	C
Quezon (0.42)	65	55	4	6	2	YES	B
Rizal (0.27)	398	294	35	69	5	YES	B
For validation	27	24	2	1	5		

Table 6. Region 4-B (MIMAROPA)

Province (R)	Total	Active	Died	Recover	New	1 per M	Grade
Marinduque	6	2	0	4	0	YES	A
Occidental Mindoro	4	2	1	1	0	YES	A
Oriental Mindoro	13	9	3	3	5	YES	D
Palawan	2	1	0	1	0	YES	A
Romblon	2	2	0	0	0	YES	A
For validation	1	1	0	0	0		

Table 7. Region 5 (Bicol)

Province (R)	Total	Active	Died	Recover	New	1 per M	Grade
Albay (1.43)	40	31	3	6	8	YES	D
Camarines Sur	12	10	1	1	0	YES	A
Catanduanes	1	1	0	0	0	YES	A
For validation	1	1	0	0	0		

Table 8. Region 6 (Western Visayas)

Province (R)	Total	Active	Died	Recover	New	1 per M	Grade
Aklan	8	3	0	5	1	YES	B
Antique	14	10	0	4	2	YES	B
Capiz	5	0	2	3	0	YES	A
Guimaras	2	2	0	0	2	NO	C
Iloilo (2.17)	45	27	5	13	15	NO	D
Negros Occidental	15	9	2	4	4	YES	B
For validation	3	3	0	0	0		

Table 9. Region 7 (Central Visayas)

Province (R)	Total	Active	Died	Recover	New	1 per M	Grade
Bohol	1	0	0	1	1	YES	B
Cebu (not including Cebu City) (1.73)	155	134	7	14	73	NO	D
Cebu City (1.73)	1248	1220	9	19	468	NO	D
Negros Oriental	7	0	3	4	0	YES	A
For validation	10	10	0	0	7		

Table 10. Region 8 (Eastern Visayas)

Province (R)	Total	Active	Died	Recover	New	1 per M	Grade
Leyte	2	2	0	0	0	YES	A
Northern Samar	1	0	0	1	0	YES	A
Western Samar	11	9	0	2	1	YES	B

Table 11. Region 9

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
Zamboanga del Sur (2.21)	46	40	2	4	34	NO	D
For validation	3	3	0	0	3		

Table 12. Region 10

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
Bukidnon	1	0	0	1	0	YES	A
Camiguin	1	0	0	1	0	YES	A
Lanao del Norte	5	1	2	2	0	YES	A
Misamis Occidental	5	3	1	1	2	YES	B
Misamis Oriental	7	3	3	1	4	YES	B

Table 13. Region 11

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
Davao de Oro	2	0	0	2	0	YES	A
Davao del Norte	12	0	1	11	0	YES	A
Davao del Sur (not including Davao City)	2	0	0	2	0	YES	A
Davao City (2.15)	136	51	19	66	39	NO	D
Davao Occidental	1	0	1	0	1	YES	B
Davao Oriental	3	0	0	3	0	YES	A

Table 14. Region 12

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
North Cotabato	3	1	0	2	0	YES	A
Cotabato City	6	0	0	6	0	YES	A
South Cotabato	4	1	0	3	0	YES	A
Sultan Kudarat	3	0	1	2	0	YES	A
For validation	2	2	0	0	2		

Table 15. BARMM

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
Lanao del Sur	9	0	3	6	0	YES	A
Maguindanao	1	0	0	1	0	YES	A
Sulu	1	0	1	0	0	YES	A

Table 16. CARAGA

Province (<i>R</i>)	Total	Active	Died	Recover	New	1 per M	Grade
Agusan del Norte	3	3	0	0	0	YES	A

Table 17. NCR Cities and Municipality. Here, R is indicated (no LGU qualifies for the 1 per Million case per day). Data for Pateros was absent from DOH database on May 9, so the last update for Pateros on May 7 was used.

LGU	Total	Active	Died	Recover	New	R	Grade
Caloocan	250	194	24	32	23	0.80	C
Las Pinas	206	146	12	48	5	0.41	C
Makati	477	309	30	138	34	0.64	C
Malabon	63	52	4	7	16	1.80	D
Mandaluyong	445	344	33	68	7	0.26	C
Manila	833	585	69	179	99	0.91	C
Marikina	138	75	18	45	7	0.54	C
Muntinlupa	179	120	24	35	16	0.71	C
Navotas	42	33	5	4	8	1.52	D
Paranaque	500	357	39	104	50	0.81	C
Pasay	232	188	14	30	23	0.74	C
Pasig	311	201	46	64	10	0.47	C
Pateros	24	15	2	7	1	0.48	C
Quezon City	1523	1020	121	382	164	0.97	C
San Juan	243	136	33	74	11	0.55	C
Taguig	287	214	12	61	19	0.57	C
Valenzuela	114	89	7	18	9	0.59	C
For validation	1073	1026	28	19	650		

SUMMARY RECOMMENDATIONS

Four grades were provided, based on the number of new cases (over the past 7 days), and the measured reproduction number. Grade A includes those with no new cases over the past 7 days. The list includes provinces under GCQ, and some provinces under ECQ, such as Nueva Ecija. Grade B includes those with a low number of new cases, i.e. less than 1 new case per day per million of population. The list also includes many provinces under GCQ, but also includes provinces under ECQ, such as Bulacan, Cavite, Pampanga, Quexon, Rizal, Tarlac and Zambales. Grade C includes many provinces under ECQ, and some provinces under GCQ that have some resurgence in Covid-19 cases. These provinces and cities have low number of new cases but this may need to be further decreased. The list includes Bataan, Laguna, and Guimaras. Finally, Grade D are cities and provinces where the calculated R is still greater than 1. Continued implementation of the ECQ is needed in order to manage the spread of the pandemic. The Grade D list includes the entire NCR, Davao City, Cebu City and the province of Cebu, Batangas, Albay, Iloilo and Zamboanga del Sur. The list is subject to re-evaluation based on updated data.

We emphasize that the number of new cases and a low transmission rate (low reproduction number R) are just some of the factors to be considered in deciding whether to continue or lift the quarantine in an area. This factor is highly dependent

on accurate data, and any delays in transmitting reports will affect the grade of a province or city. Erring on the side of caution is always recommended. In addition to the low number of new cases and low transmission rates, it is advisable that the province or LGU must also meet the minimum testing requirements and health safety measures put in place. Given these scenarios, we recommend the following:

1. That the national government (NG) should **consider extending the enhanced community quarantine (ECQ) beyond May 15, 2020** for the following areas: **National Capital Region, Batangas, Albay, Iloilo, Cebu, Zamboanga del Sur, and Davao City**. The NG may also consider extending the ECQ for Bataan, Laguna and Guimaras, depending on their health provisions. As shown above, there had been gains due to the ECQ. The goal is to sustain these gains until such time that it has scaled up and rolled out its programs and its initiatives for mass testing, contact tracing and isolation of infective individuals. We wish to emphasize that we are faced with a choice not between the economy and public health (lives vs livelihood), but between a less or more costly disruption to the lives of ordinary Filipinos. Based on our data, if the ECQ is lifted prematurely, we will be faced with another wave or a surge in transmissions that is certain to squander our gains forcing us to make further costly interventions and increasing the total economic cost and the number of lives lost.

It is in this light, that we exhort the government to reconsider its plan of relaxing the ECQ for selected cities within Metro Manila. We believe that it is premature to consider this proposal given the paucity of reliable data to support it at this time. Moreover, the proposal will not just be technically and administratively challenging to implement in an integrated structure like Metro Manila but it will also further burden our LGUs that are now focused on scaling up their testing, tracing and isolation capabilities as well as their local health capacities and facilities. We believe that this proposal will create additional risk as the relaxation of the ECQ will encourage increased mobility, a driver of the virus, in some cities in Metro Manila. It is possible that this may lead to increasing transmissions of COVID-19 infections and could possibly lead to more deaths.

We **caution** the government against the premature relaxation of the Enhanced Community Quarantine without substantial data and without the minimum health safeguards in place in affected areas regardless of the historical number of cases.

2. We laud the national government and the private sector for expanding testing capability all around the country over the past few weeks to around 8,000 tests per day. We continue to exhort the expansion of our testing capability to enable mass testing. We reiterate the strategic importance of the continued expansion of our testing capability. This will enable a greater number of our labor force to return to work and hasten economic recovery.

The estimate for the United States contained in a roadmap published by the Edmond J. Safra Center of Ethics at Harvard University is between 2 to 6 percent of the population. This estimate, however, is applicable if the economy is going to re-open fully. Given that restrictions will be in place, a capacity similar to that of South Korea, at 15,000-tests per day for Luzon, would be optimal given that South Korea and the island of Luzon both have a population around 50 million people. Testing will help us determine the actual number of Covid-19 cases and prevent infective individuals, particularly asymptomatic cases, from spreading the virus. This will help our policy makers put in place the appropriate rules for each region or area.

3. Contact tracing is the weakest link in our national response to the Covid-19 pandemic. We continue to reiterate the need for an efficient and effective contract tracing system to track those who could have been exposed to the infective individual. To this end, the national and local government should consider hiring and training more personnel to do contact tracing. Where applicable, digital contact tracing apps should be used. While technology like peer-to-peer warning system and other apps are available, there might be limited utility in certain areas where smartphones are not prevalent. More than locating and identifying suspected cases, proper attention must be given to ensure that the person is not put in harm's way by maintaining privacy. Mass testing without effective contact tracing will only increase the value of R and without stemming possible new infections especially once the restrictions are loosened.
4. We continue to reiterate our recommendation on the necessity of widely available supportive isolation programs and facilities (especially in the LGUs outside of Metro Manila) sufficient to accommodate suspected and confirmed cases with mild or no symptoms especially in areas that will loosen restrictions on mobility. Provisions for food and other forms of social amelioration for patients during the quarantine period might be needed to ensure that they will observe restrictions in place.
5. The ECQ is working and has been critical in reducing transmission and deaths due to Covid-19 in the Philippines. We need to sustain the efficient and effective implementation of quarantines all over the country despite the fact that they are costly and unsustainable initiatives in the short run. The national government needs to shorten the length of time of our quarantines to reduce its negative economic, governance and social impact. To do so will require government to augment quarantines with massive testing, effective tracing and supportive isolation programs, as is the best practice around the world. Moreover, the government needs to sustain unprecedented levels of collaboration and cooperation between civil society and the private sector. To do so, the government should ensure that **quarantines implemented all over the country are humane and ethical, protective of civil rights and**

due process, and provide mechanisms that respect health and data privacy.

6. We also recommend that greater effort be given to the expansion of the health system capacity especially those needed to combat Covid-19 like personal protective equipment, ventilators, and isolation rooms. Considering that people afflicted with other diseases would also need a share of the health resources, shortage of health facilities and supplies could result in deaths not because of Covid-19 but due to being crowded out from the Covid-19 strained health system. We need to scale up hiring of health human resources to deal with the medium to long term impact of the pandemic.
7. We continue to reiterate with urgency for the Department of Health (DOH) to hasten the setting up of Covid-19 laboratories and the accreditation of other laboratories across the country. To this end, we are suggesting that the DOH consider utilizing laboratories hosted in DOH-owned hospitals and in state universities and colleges with medical schools and vacant land. This network of Covid-19 laboratories will help enable the massive testing needed in the months to come.
8. The implementation of the quarantine should be made more effective in scaling up the government's **information drive to inform individuals and businesses of their responsibilities on the new normal** especially the guidelines issued by the various agencies.
9. We laud the government for extending the distribution and expanding the coverage of the social amelioration program. The government, however, needs to improve the implementation of this program in order to urgently and expeditiously distribute these resources including relief goods with focus on efficiency, effectiveness, and reduction of pilferage and corruption.

While we have collectively achieved a lot together, we must not be complacent as we are not where we are supposed to be as far as dealing with this pandemic. We are still in the early part of managing this crisis. It is against this backdrop, that we encourage ever greater cooperation and collaboration between government, business, and civil society moving forward.